Analysis of Standard Work in the Columbus Fire Alarm Office

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Certification Statement

I hereby certify that this project constitutes my own product, and where the language of others is set forth, quotation marks so indicate, and appropriate credit is given where I have used the language, ideas, expressions, or writings of others.

I would like to thank FF Jason Mayberry, and FF Curtis Luckett of the Columbus Fire Department for their assistance in providing quality assurance data for assessment and use in this project.

Signed_____

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Abstract

This applied research project (ARP) was an analysis of variability reduction in the Fire Alarm

Office (FAO) of the Columbus, Ohio Division of Fire by creating standardized work practices.

The problem was the Columbus Division of Fire has missed opportunities to be highly reliable in

dispatching emergencies due to the lack of standardized work flow in the communications

center.

The purpose of this research project was to determine methods to reduce the variability in

the process flow of the Columbus Fire Alarm Office. The descriptive research method was used

to analyze the communication center. The research questions were:

1. What areas exist within the current practices of the fire alarm office to reduce
    variability?

2. What best practices exist in other organizations and public safety answering points
    (PSAP) to reduce variability?

3. What barriers exist to standard work flow in the Columbus Fire alarm office?

4. How does the use of temporary staff create variability within the FAO?

A literature review was conducted on the history, risks, benefits, and culture of

standardized work flow. Interviews were conducted with firefighters with a background in

private sector organizations that utilize standard work practices. Site visits were conducted with

faculty from The Ohio State University Fisher College of Business. A questionnaire was

distributed to the staff of the Fire Alarm Office to gauge opinions and beliefs of the staff related

to standard work. Quality assurance data was reviewed to determine where variability existed

within the organization.

The results demonstrated that variation does exist in the processes of the Columbus FAO and there is disconnect between the benefits and understanding regarding standard work. Additional research is recommended to identify structural work flow barriers to good process to reduce waste.

Table of Contents

Page

Appendices

Tables

Introduction

Aristotle is quoted as saying that we are what we repeatedly do. Excellence then is not an act, but a habit. This is the basic goal of establishing standardized work. Although the fire service has a history of having established standard operating procedures (SOP) and protocols for both fire and emergency medical services (EMS) emergencies, how the mission gets accomplished within that SOP or protocol frequently varies within shifts and even among responding crews.   The problem identified is the Columbus Fire Alarm Office (FAO) has missed opportunities to be highly reliable in dispatching emergencies due to the lack of standardized work flow. The purpose of this project is to identify methods to reduce variability by standardizing work flow in the communications center. The research method will be descriptive. The research questions to be answered are 1. What areas exist within the current practices of the fire alarm office to reduce variability? 2. What best practices exist in other agencies and public safety answering points (PSAP) to reduce variability? 3. What barriers exist to standardize work flow in the Columbus Fire alarm office? 4. How does the use of temporary staff create variability within the FAO?

Background and Significance

The Columbus, Ohio Division of Fire is an all hazards agency protecting 750,000 residents of Columbus and Franklin County. In 2010, the Columbus Division of Fire responded to 160,000 requests for assistance in which 110,000 were emergency medical service requests. These emergencies are answered by 1500 dual-role cross trained firefighter/emergency medical technicians responding from thirty-two strategically located engine houses over 240 square miles. (Columbus Division of Fire Annual Report, 2010)

Requests for assistance are received through an enhanced 9-1-1 communication network. The Columbus Police Department is the primary answering point for all calls. Requests for fire or EMS are then transferred to the fire communications center. The fire department staffs the FAO with fifteen firefighter/emergency medical technicians and two lieutenant supervisors working twenty-four shifts. They are supplemented by a five member staff working 40 hours a week in support of the dispatch activities. The FAO answers an average of 25,000 phone calls a month and processes over 13,000 emergency 9-1-1 calls a month. Seventy-four percent of these calls now come from cell phones.

The City of Columbus is contracted to dispatch for six regional municipalities through a reciprocity agreement in which the city dispatches for them as though they were a Columbus company. This has placed an increase of approximately 30 runs a day on the Columbus FAO and has presented challenges such as same or similar streets in multiple jurisdictions such as High Street, Main Street, etc. and in some cases may even have the same numerical address range. The problem is the Columbus Fire Alarm Office has missed opportunities to be reliable in processing emergencies due to the lack of standardized work flow. The purpose is to identify methods of standardizing work flow in the fire alarm office to reduce variability.

The research questions to be examined are 1. What areas exist within the practices of the fire alarm office to reduce variability? 2. What best practices exist in other organizations to reduce variability? 3. What barriers exist to standardized work flow in the Columbus Fire Alarm Office? How does the use of temporary staff create variability in the FAO? The research links to the United States Fire Administration (USFA) goal C – Improving the fire and emergency services capability for response to and recovery from all hazards. This project is prepared in direct relationship to the Executive Development (R123) program of the Executive Fire Officer Program. (Academy, 2010)

Question one will be researched by conducting a questionnaire of those working in the FAO. Question two will be answered by conducting site visits and education with professors in lean management from the Fisher College of Business at The Ohio State University. Interviews will be also conducted with firefighters who have a background in other professions where standard work is a staple of the organizational culture. Question three will be answered by conducting a questionnaire of those assigned to the FAO. Question four will be answered through analysis of the quality assurance data that exists regarding performance of the FAO staff.

Literature Review

It is generally agreed the public has an expectation of 9-1-1 to be highly reliable, accurate, and timely.   But what constitutes highly reliable? There are national standards in place for emergency communication centers in the United States. These represent best practices developed over time, and are defendable to both the general public and to legal review.

A standard is the best way an organization knows how to do something at a given time and standardized work is the way employees implement the work. (Jackson, 2006) The purpose of implementing standardized work practices is to detect and correct errors and abnormal variation in processes. You can then determine whether the cause was in the system, the process, or the person completing the work. As a general rule, Jackson established three causes of variation of standard work. First, product defects occur when something is broken and in need of repair, not available for any other reason, or the defect is rooted in the process and need revised. Second, human error is involved when a variation of standard work occurs due to the decision of the operator. Third, abnormal conditions existing within the operation lead to errors. (Jackson, 2006)

Providing standard work helps agencies meet the demand of benchmarked standards for things such as call to dispatch times. In many centers such as Columbus, dispatchers are held to a 60 to 90 second window from call to dispatch. Since dispatchers are benchmarked to these standards, they work to meet it and routinely do. Approximately 6% of calls exceed this benchmark. Several reasons have been identified for these calls to exceed 90 seconds such as language barriers, etc.

It is important employees are provided information on the progress of their call taking and processing skills. Mistakes made need to be addressed and each center should have a plan in place to access the process and determine if the variation was due to an error in the standard work or whether the employee failed to follow the standard work. Employees know they are being held to a standard, who see those standards are tracked and reported, and are given feedback on performance are more likely to follow standard work. It also allows quality assurance coordinators to trend benchmarks to see if variations are occurring with a pattern to them. It allows for quicker correction of the variation. Research completed by H.W. Heinrich in the 1930's determined variations resulting in some tragic event occurring usually have trended that way over time with less severe outcomes. This variation for standard practice then somewhat becomes a standard way of operating. Heinrich taught sharing variations in a non-punitive and non judgmental way allows information to be shared in a learning environment to reduce further risk of errors. It also helps eliminate the cover up of variations related to fear of discipline. (Brophy, 2008)

The history of standard work in mass production was introduced by Henry Ford in the production of the Model T. It was mastered by the Taiichi Ohno, the Japanese wood loom maker who modernized the process through Jidoka, automation with a human touch. Ohno studied the

principles of Ford and with the help of W. Edward Deming implemented the processes into the Japanese automotive industry at a time when the United States auto industry was moving away from the practices.

Known today as The Toyota Production System, TPS is the guiding principle behind the development of process improvement and employee development at Toyota. TPS begins by defining the service the customer wants or expects. In the case of the FAO, the customer expects the right response to the right emergency in the right amount of time, with pre-arrival instructions given in between. Deming's teachings include the task of meeting the customer's needs both internally, which can be the responding fire/EMS crews, and externally, the public which is the task of everyone in the organization. Toyota sees standard work as the foundation of process improvement to reduce variation leading to errors which creates rework. They enforce standard work principles, not as punishment or to frustrate workers from making work routine, rather to empower them to improve the process and make production better for the overall good of the organization. They help employees work toward perfection through using standard processes inside a system that has been perfected over time while striving for daily improvement which created value in the process. (Liker, The Toyota Way)

Great organizations that are reliable have systems in place to promote predictability and consistent results while always seeking to improve. Organizations frequently overburden their more productive staff members by going to them repeatedly to get work accomplished. They are often the informal leaders of the communication center and challenged to "pick up the slack" for lesser performers around them. This burden of productivity adds additional stress and can be a source of burnout and disengagement. (Covey, 2009)

In 2006, Fratus prepared a NFA research project on highly reliable organizations. The hallmark of a highly reliability organization (HRO) is that all members understand that any error can lead to catastrophic consequences. Therefore, HRO's need to become learning organizations and actively seek methods for continual improvement. These methods include understanding the root cause and effects of errors, taking the knowledge gained from mistakes and using it constructively. We then manage the cultural power of the organization while building an open communication network that allows a shared understanding of all challenges and expectations faced by the team. (Fratus, 2006)

The expectations of the public were outlined in a 2011 research study published in the Journal of Emergency Dispatch in which 81.4% of respondents expected if they called 9-1-1 for a person who had collapsed in front of them and was in cardiac arrest, they would receive pre arrival CPR instruction. In choking situations, 86.2% expected to be talked through the Heimlich maneuver by the dispatcher if needed. (Amelia Clawson, May/June 2011)

To develop methods of standardization in the workplace requires a culture shift. Culture drives performance within an organization. By building a culture around behaviors you desire, people will gradually build habits around these behaviors. (Frock, 2006)

Culture shift is built on establishing excellence. Excellence does not mean perfection. People will make mistakes. If employees are not empowered to take risks and believe they will not have the support of management, they will not take the chance to take performance to the next level. Mistakes need to be examined, learned from, and hopefully not repeated. (Studer, 2008)

Call takers failing to use standard work practices create gaps in their interrogation due to periods within the call where the dispatcher is thinking what to say or the next question to ask. This is

frequently seen in processing the call of a distraught caller. Techniques such as detachment and repetitive persistence are used to reduce the requester's anxiety. Standard work practices help the call taker take control of the call instead of the call controlling them. It can help prevent failure to get correct information from the caller. (Clawson, 1998)

As dispatchers become comfortable with their positions, they can begin to freelance by placing their own opinions and comments into the call taking process outside of the accepted standards of work established within the policies and procedures of the center. Although they believe they are using their best judgment based on experience, it deviates from the accepted standard and in many cases violates the policy of the organization. According to the teachings of Dr. Clawson, utilization of policies and protocols is the one way dispatchers can process calls in a way that is predictable, repeatable, and verifiable. (Clawson, 1998) Failure to follow established standard guidelines places the call taker, the supervisor, and the organization at risk for liability.

The FAO is staffed by fulltime assigned staff replaced by alternates as needed due to vacation, sick leave, etc. These alternates do not work daily in the FAO. There is no set requirement by the division of fire that stipulates how many days a month a firefighter needs to work in the dispatch center to maintain proficiency. Several studies demonstrate skill degradation in where frequency of skill utilization is low. (Vrotsos, 2008)

The pace of the required work load of any emergency dispatching center fluctuates during the course of a day. Trying to staff to expected demand based on past historical data can cause over and under utilization to occur. This fluctuation creates opportunities for additional variation related to ending a call due to unexpected demand in the dispatching center. This requires outside the box thinking as well as multi-tasking. Both of these can encourage free-

lancing that can lead to variation. Standard work practices help to protect both the caller and the call taker. It reduces the opportunity to eliminate avoidable errors by using standard policies and protocols that are used correctly. They have been tried and tested in the non heat of the moment scenario. (Steele, 1993)

Liability is the main threat to not having documented standard work in the FAO. Adhering to standard processes allows a dispatcher or call taker to place the burden of responsibility back onto the system and the process instead of having the issue directed at them. The subject of liability always comes up when the subject of dispatching is mentioned. James Page in 1981 stated

"The point is, while dispatching personnel express anxiety over the possibility of liability for providing such as service, we may well see the day when an organization faces allegations of negligence for not providing such a service"

It took twenty years for Page's comments to ring true for the City of Chicago. In the 2000 court case Gant vs. City of Chicago, a jury found in favor of the plaintiffs, awarding a staggering $50 million dollars in damages. This was the largest verdict ever against the city of Chicago and stemmed from a 9-1-1 call involving a dispatch delay to an asthma attack where dispatchers did not give pre-arrival CPR instructions. (Garza, 2001)

Instinct is a gift that cannot be ignored. Many of the best firefighters and paramedics have a gut instinct about a patient condition or a building situation they gain from years of knowledge and experience. These experiences and instincts cannot be overlooked in the discussion of establishing standard work practices. Many argue that implementing standard work takes away ability to do what needs to be done in the best interest of the patient or the crew. Others experienced in standard work would call this freelancing and recognize that while

every situation cannot be covered in an emergency dispatching center, more risk occurs from failing to follow the standard work and variation should be the exception and not the rule.

Research conducted by Psychologist Keith Payne found when people are under time related stresses such as dispatchers attempting to move calls through the system, they stop relying on actual evidence related to their senses and fall back on stereotypes even though they may not realize it or condone it. (Gladwell, 2005) This can be potentially troublesome when an operator has a hysterical caller refusing to calm down and answer questions. When you perform quality assurance on these calls, you can sense the frustration of the call taker and the call does not get processed in the desired method. The call taker will let the caller control the call instead of taking control of the call themselves. They fail to obtain the correct information to get the proper response or give the pre-arrival instructions that should be given. Don Hardy, Former Managing Director for FedEx Operations in Australia is quoted as saying that "A stressed mind is in survival mode. A stressed mind in not in creative mode" (Birla, 2005)

Although we want dispatchers to be innovative and think outside the box, we find that the brain relies on past memory to develop creative ideas. If the knowledge base is old and out dated, or has limited knowledge on the issue, the solution is limited in scope and frequently incorrect. (Birla, 2005)

Variance is the difference between the results to strive for compared to the results you obtain. Measurement and transparency help drive accountability in the workplace. When people see metrics associated with the work they complete, they can then adjust their actions to get better results. This is an on-going example of the Hawthorne effect. Only measurement of the process allows for improvement. The goal is to promote long term sustainability to these actions.

Bill Marriott, CEO of Marriott International described the 66 step process for cleaning rooms in their hotels. The idea of having systems and procedures in place for everything is a very natural and logical thing. "To produce a consistent result you need to figure out how to do it, write it down, practice it, and keep improving it until there is nothing left to improve" (Marriott, 1997)

The fire alarm office is staffed by permanently assigned members supplemented by alternates temporarily transferred to the communications center to backfill staff for assigned staff who are absent due to vacation, sick leave, etc. Studer has described this concept as renters versus owners. Alternates or renters frequently deal with what they have to, only when they have to, and leave the rest to others. The assigned staff accept ownership in the facility. They see the big picture and take pride and responsibility by focusing on the long term sustainability. (Studer, 2008)

A dangerous situation in the work place is created due to freelancing. There are no intentional incorrect responses or instructions given to the callers, but considerable variation exists that can lead to error. Every article on emergency medical dispatcher (EMD) liability references this variation. The ability to remove variation through standardized pre arrival instructions that have been tried, tested, and verified over time. It helps to place the burden of responsibility on the organization instead of the individual call taker and it is the only way to assure the individual call taker is not pushed to the forefront of liability for not following communication center policies.

This holds true in the communication center where everything is recorded to the second and quality assurance is a large part of system development. In order to begin to understand the causes of variation we need to study human error. Researcher Sidney Dekker describes the bad

apple theory of human error. It relates to erratic behavior from unreliable people who can simply

choose to not make errors. Investigations often conclude operators failed to notice certain data

or did not follow procedures set forth. The response of management in these situations is to

retrain and hold particular individuals accountable by tightening policies and procedures. But

underneath every simple, obvious error is a deeper, more complex situation where well

intentioned people are in imperfect systems. Human error is then inevitable when people pursue

excellence in an imperfect system. These people do not set out to make errors. What they are

doing makes sense to them at the time. (Dekker, 2006)

Distractions have been identified as consuming 28% of the average workers day.

Distractions can come from multiple sources and attempts should be made to minimize

distractions in communication centers. This can only be accomplished to some extent, because

dispatchers are human beings and have multiple competing interests. Home and child issues,

social networking, as well as work related demands and changes; all challenge the focus of

employee's attention and lead to a risk of error. (Covey, 2009)

The primary benefit of implementation of standardized work is eliminating waste within

the organization. This waste can be seen as either financial waste or waste related to time

management as in call processing times. By stabilizing policies and practices, error rates

decrease across the organization and any member should be able to function in any job within the

organization. This promotes a greater sense of safety within the alarm office as well as the

public by making sure the proper dispatch occurs. Standard work also allows for a quicker

evaluation of what is considered a normal versus abnormal situation as the situation develops.

Communication centers have a dynamic and constantly changing environment. The

needs of each caller and the demands of the responding crews frequently make dispatchers

believe implementing standard work is impossible. Buy in on standard work and implementation

is difficult to get for each of the three units. We cannot control every aspect of the job when

things start to happen at a fast pace, standardization is the key to making sure things do not get

overlooked. (Murphy, 2005)

In the book Flawless Execution, James Murphy Chief Executive Office of Afterburner,

Inc., outlines how the military deals with task saturation. He describes how checklists and cross-

checks are a staple for pilot safety. These checklists outline each of the specific steps in the

process of executing a mission. Standard operating procedures are summarized in the checklists

to prevent missteps along the process. The use of these checklists is mandatory.

The U.S airline industry has one of the safest aviation records in the world. Standard

work practices are a daily part of this safety regimen. They use checklists to verify operations

such as take-off and landing procedures as a reminder of safe operations to help reduce task

saturation. We use standard reminders everyday in our own lives. Whether it is an alarm clock

to get up in the morning or a calendar book to keep appointments, most of us would be lost

without some form of daily reminders to keep us on track. (Roe, 2010/2011) The federal

government has built these checklist into the requirement for airline safety in the U.S. known as

the Federal Aviation Regulations (FAR) section 135.83 requiring operators of aircraft to have

checklists for starting engines, before take-off, cruise, before landing, after landing, stopping

engines, and emergency cockpit checklists containing the procedures regarding hydraulics, fuel,

electrical, and mechanical systems. (Transportation, 2010)

Southwest Airlines has over 3,400 flights a day. They have embraced the culture of

standardized work since the airline's inception to consistently rank as one of the best airlines in

the industry and remained the only consistent profitable airline annually. Their philosophies

consist of flying one single aircraft. They believe they can keep cost down by standardizing

crew training and maintenance to one airframe. (Freiberg, 1997)

Standardization is visible in any McDonalds, Starbucks, or Subway restaurant anywhere

in the world. How can the food be prepared, presented, and tastes the same in every store? Dave

Olsen summarized this philosophy nicely in The Starbucks Experience when he stated it didn't

matter how many times they got it right if the one cup of coffee they serve doesn't suit you.

(Michelli, 2007)

Many organizations believe that standard practices and processes inhibit innovation and

are hard to grasp, yet historically many organizations themselves are not innovative. The

innovation comes from the people within the organization. The top performers within

organizations are the ones who understand their specific field at a higher level than the average

worker. While they perceive more, know more, and remember more than others, the focus

appears they put more effort into it than others. (Colvin, 2008)

Research on information overload shows that as call takers get busier they begin to

disregard information they feel is of low-priority. As municipalities grow in demand, low

priority information may contain data important to the responders but not understood by the call

taker and dispatchers. As well, they may take short cuts by re-prioritizing their roles and

responsibilities, ignoring accepted standard work justifying it as to time consuming and not

important. A 2003 study confirmed that when information overload occurs people have

difficulty processing which information is relevant. It requires dispatchers to multi-task which

can seem to be an effective method but it actually increases the risk of errors and leads to an

increased risk of disease from increased production of hormones such as adrenaline. Dispatch

centers are dealing with this issue more than ever today as they deal with new computer aided

dispatching systems and next generation 9-1-1 technology. This technology is able to handle and process more information than ever and put the information in the hands of emergency responders. Although the first challenge is determining if information overload is occurring, the primary challenge is getting dispatchers to accept the evidence and embrace standardized work practices as a method of improving performance and reducing the risk of variation.(Pendleton, 2008)

Standard work practices also help reduce stress within the organization that can lead to physical and emotional illness. A 2003 French study examined stress in dispatch centers. Researchers measured salivary Cortisol levels in dispatchers. Increased stress has been linked to elevated Cortisol levels in the body, and persistent elevated levels have long term damaging effects on the health of dispatchers. They found that Cortisol levels were elevated in dispatchers throughout the day no matter when the level was measured compared to the control group. (L. Weibel, 2003)

Continuous improvement, known in lean management as Kaizen is not easy. Jim Casey, founder of United Parcel Service, was famous for preaching that anyone could deliver packages, what made the difference with UPS was the quality built into the process. He attempted to create a culture of constructive dissatisfaction. This entailed pushing people out of their comfort zone even when things are going well for their business. (Dalzell, 2007)

A draft report of assessment guidelines released by the 911 Resource Center in June, 2011 concluded that no standardized network exists in the current 9-1-1 environment although some specific components are seen as occupational standards. They believe that standardization will become increasingly more important to enable seamless connectivity between 9-1-1 systems as the public has come to expect a uniform delivery of services. They urge states to adopt these

recommendations as specific requirements to promote standardization across agencies. (Center,

2010)

Studies have shown the faster CPR is started the better the survival rates for out of

hospital cardiac arrest. It was determined that ventilations were a barrier to getting lay person

involvement in CPR for strangers, and also found there is no difference in survival rates between

compression/ventilation CPR and compression only without ventilation. (Bobrow, 2010) The

FAO in Columbus has instituted standard work pre-arrival protocols reflecting these recent

changes. Research conducted by Michael Sayre M.D., a researcher from Ohio State University

Medical Center concluded emphasis on scripted assessment improved sensitivity in identifying

the probability of dispatchers recognizing cardiac arrest events over the phone. (Sayre, 2011)

The next question is how to implement standard work practices into a communication

center like the Columbus Fire Department. It is easy to put a policy in place announcing you are

moving to standard work and all staff will be responsible to comply with the policies. While this

is the easiest part of the process it may actually increase the responsibility and the liability to the

organization if handled in this manner. In many circumstances you will see an increase in

compliance for a brief period of time, but simply defining the work does not assure good

performance will follow. The purpose of defining the work is to make it visual to those

responsible for the work by using job instructions. (Liker, The Toyota Way)

Job Instruction Methods specifically outlines the elements or processes required to

complete the task correctly. It provides the required steps to complete the process successfully,

and demonstrates what the end results should be. In the case of the FAO this would be specific

instructions for each step of the call taking process from answering the phone to dispatching the

run. Those who demonstrate proficiency in completing the task correctly are expected to have less variation in the process.

Good job instruction is seen as a prerequisite of standard work. Job instructions are step by step learning for the end user to grow in their role. Adequate job instruction helps identify work elements and the key points needed to successfully complete tasks. It also makes teaching these tasks to newer employees easier by reducing the confusion associated with statements such as "let me show you how I do it." These statements leave it to the employee's discretion how to accomplish the task best in their opinion without having the research and skills associated with standardized work. (Liker, 2007)

In Leadership on the Line, Heifetz and Linsky believe adaptive work creates risk and conflict within employees and organizations. This creates instability due to changing deep rooted entrenched norms that exist. This leadership style requires taking people out of their comfort zone. The key they describe is doing this at a rate that can be absorbed and managed. (Linsky, 2002)

The real challenge to move an organization toward standardized work is obtaining the commitment and the buy-in from those responsible for implementation of the program. This will only be accomplished by including them at the beginning of the process. Staff must have involvement in this process and must be brought along as the standardized work policies and practices are developed. This sense of ownership will be required to make the project successful. Staff will need to see how this will reduce their liability and how you are going to deal with the additional work requirements placed upon them. Their concerns must be taken seriously by administration because no matter how irrelevant staff member issues and concerns are to management, they are real to the end user of the product. (Liker, Toyota Talent, 2007)

Once programs and policies for standard work are established, the work is just beginning. Sustainability is like gravity. If you do not keep propulsion moving a rocket forward gravity will return it to the original earthen launch site, rendering all your hard work useless. The same concept occurs with standard work practices. Small victories must be celebrated and shared to begin gaining trust and respect of those being asked to perform the work. From there, they will begin to see the benefit. When there is an issue, it should be reviewed and distributed to staff as a teaching opportunity and a way of making the process better, just like in the Toyota model.

Challenges in standardizing work flow include the long held beliefs of those involved in the change. People work to validate their beliefs by filtering the new experiences they have and compare it to their current beliefs. They cling to these old beliefs fighting every attempt to make them surrender them. They fail to take accountability for the beliefs they form. They describe them as natural conclusions arising from their negative experiences with those responsible for the change. This then leads to the notion that the best indicator of future behavior is past behavior. (Smith, 2011)

In his book Blink, author Malcolm Gladwell describes the genesis of standardized work in the emergency department of Cook County Hospital in Chicago. Gladwell believes extra information is frequently thought to be useful and required to make decisions when, in reality it can be harmful, confuse the issues, and contribute to error. He relates the story of Brendan Reilly who was the chairman of the department of emergency medicine for the hospital. Reilly saw extensive medical work-ups completed on each patient presenting with chest pain. Although a small percentage were actually having a heart attack, there were a number of patients discharged to home who appeared healthy when in reality they were in fact suffering from coronary artery disease. This added considerable expenses to the hospital and tied up resources

such as bed space. Reilly took twenty typical emergency department cases presenting with chest pain to different physicians throughout the hospital ranging from the ED to cardiology and asked for a treatment plan based on the scenarios. He was amazed to see that they all had different treatment plans and there was no consistency in any of the cases.

Reilly teamed up with a cardiologist named Lee Goldman and with the support of the military, developed a decision tree utilizing standard practices for the treatment of chest pain found to be accurate in 95% of the time in determining patients who weren't actually having a heart attack while outperforming physicians in some cases by twenty percent. This was the beginning of standard practices in the management of patients with chest pain and the development of accredited chest pain centers to decrease door to reperfusion times. (Gladwell, 2005)

In a 2002 National Fire Academy (NFA) Applied Research Project (ARP) on Learning Organizations, Martinette quotes Careely and Harrand. They describe organizations not attempting to embrace new learning opportunities will suffer from failures in organizational strategy and may avoid issues seen as too difficult or complex. These organizations need to change the culture by building a foundation to increase member's ability to learn. (Jr., 2002)

In June, 2008 the National Emergency Number Association (NENA) published standard 56-006 which was developed to serve as a standard for the adoption of standardized call-processing protocols for use by emergency communication processing centers, to provide uniformity and consistency in the handling of 9-1-1 and other emergencies. Specifically they recommend standardization of call types for all emergency call types, standardization of call priorities, and pre-planned responses based upon these prioritizations. (Dispatch, Priority, 2009)

Before we can standardize the processes within our organization we have to understand

the process, which occurs in two phases. The first requires a broad overview of the role and

responsibilities of the position are about. Linsky describes this as observing from the balcony.

The work is arranged in a way to be the most functional. Work place education on the benefits

of standard work and how it reduces risk of liability are a required step in the process of

instituting standard work. Even more important to gaining employee support and compliance is

to demonstrate how standard work will benefit the employee in the work environment is a key

priority to a successful implementation.

The observations contained within the literature review demonstrate evidence that other

organizations are using standard work processes to reduce waste and error. It appears there has

been great success with these process improvement models. Standard work flow is different than

standard operating procedures and can be instituted in work areas with a variety of needs.

Procedures

To answer the research question a questionnaire was established. The fire alarm office

has either assigned staff or alternate staff members fill in from the emergency response

companies in the event of a vacancy created due to vacation, sick leave, etc of assigned staff.

Sixty-five names of all staff members eligible to work in the FAO were picked from the list of all

eligible candidates by taking every third name from a staffing list which was randomized from

each shift. The format was blinded so there was no way to identify respondents.   The questions

were formatted utilizing a Likart Scale. The questions were crafted to answer the research

questions of this ARP and to gauge the challenges of standardizing work flow within the

organization. A cover letter to participants was created. (Appendix A) The questions were also

presented to the faculty at The Ohio State University for review and recommendations.

(Appendix B)

An interview was conducted with Firefighter David Pence of the Columbus Division of

Fire on May 29, 2011 at fire station sixteen. Although FF Pence works fulltime for the fire

department he also owns two Subway sandwich shop franchises and has experience in the

expectations of standardized work flow demanded by Subway. The purpose of interviewing FF

Pence was to seek his input related to the differences he experiences in the fire service compared

to private business. This interview will help answer the following research questions. What best

practices exist in other agencies and public safety answering points (PSAP) to reduce variability?

What barriers exist in the implementation of standard work in the FAO? (Appendix C)

An interview was also conducted with Firefighter Dennis Hammond of the Columbus

Fire Department on June 14, 2011 at the FAO. FF Hammond works as an alternate in the FAO

and spent thirteen years working for Honda of America in Marysville, Ohio in both line

production and management. The purpose for interviewing FF Hammond was to determine his

perception of standard practices between Honda and the Columbus FAO. Specifically,

Hammond will be assisting with answering the following research questions: How does the use

of temporary staff create variability in the Columbus FAO? What barriers exist in the

implementation of standard work in the FAO? (Appendix C)

The Ohio State University currently offers an executive education program in Business of

Operational Excellence. Through this program, site visits occurred over between March and

July, 2011 to facilities such as Cardinal Industries, Nationwide Insurance, and Giant Eagle to

witness organizational best practices involving standard work. These site visits helped gain an

outside perspective and begin to see opportunities to help answer the following research

questions: What areas exist within the practices of the fire alarm office to reduce variability?

What best practices exist in other organizations and public safety answering points (PSAP) to

reduce variability?

Quality Assurance data was collected by light duty firefighters in the FAO. The data was

analyzed in an attempt to answer the research questions; What areas of variability exist within

the FAO? How does the use of temporary staff increase the variation? Data was randomly

reviewed over a two week period comparing both assigned and temporary FAO staff. The areas

reviewed consisted of the following:

- Was the call answered using the standard accepted method?

- Was the address and call back number verified as required by the standard work?

- Were calls transferred to the appropriate agency as required if the call was not for the

   Columbus FAO?

- Were pre-arrival instructions given to the caller as required by policy?

Descriptive research was conducted with the intent of moving toward a more structured

standardization of work flow through the processes of the Columbus Fire Alarm office to reduce

variability and the chance of error. (Appendix E, F)

Limitations

Limitations of the research include that only 56% of the staff eligible to work in the FAO

completed the questionnaire. Quality assurance work completed in the FAO gives a general

overview of performance but does not give a specific assessment of individuals or shifts. The

quality assurance data reviewed consists of less than 5% of the calls the dispatch center handles.

Results

Results from the questionnaire distributed were analyzed. Forty-Seven questionnaires

were returned from the sixty-five that were distributed. The return rate is 72%. Below each

question is identified. The Likert scale response is presented and the author's assessment related

to the impact of the responses is included.

You often see standardized work practices in the fire alarm office

a. Strongly agree		b. Agree		c. Undecided		d. Disagree		e. Strongly Disagree	
21	43%	28	57%	0	0%	0	0%	0	0%

The purpose of this question was to gauge the perception of the FAO staff regarding

standardized work. 100% either agreed or strongly agreed they see standardized work practices

in place in the communications center.

The policies of the FAO are practices consistently across the three units

a. Strongly agree		b. Agree		c. Undecided		d. Disagree		e. Strongly Disagree	
2	4%	18	37%	11	22%	17	35%	1	2%

The FAO operates three shifts working a twenty-four hour on, forty-eight hour off

schedule. The purpose of this question was to determine if the respondents felt standard work

was practiced consistently across the three shifts. The responses were divided almost equally

with 22% undecided how they felt on the issue. This response was a follow up of the previous

question where 100% felt that standard work was practiced often in the FAO but they appear

divided on whether standard work is practiced consistently across the units.

Failure to follow standardized practice lead to increase call to dispatch time

a. Strongly agree		b. Agree		c. Undecided		d. Disagree		e. Strongly Disagree	
10	20%	24	49%	7	14%	7	14%	0	0%

The purpose of this question was to determine if the FAO staff believed that standard work actual could decrease call to dispatch times. While 69% felt that this was a true statement, 28% felt either it was not true or they were undecided if it directly impacted times or not.

Failure to follow standard work practices increases error in the FAO

a. Strongly agree		b. Agree		c. Undecided		d. Disagree		e. Strongly Disagree	
13	27%	29	59%	4	8%	1	2%	1	2%

This question was to supplement the previous question on call to dispatch times. Specifically this question was to determine if the staff believed standard work was a benefit in decreasing the error rate in the FAO. An overwhelming 86% agreed failure to follow the standard work resulted in additional errors in the FAO.

Failure to follow standard work places the city at risk of litigation

a. Strongly agree		b. Agree		c. Undecided		d. Disagree		e. Strongly Disagree	
11	22%	25	51%	9	18%	10	20%	0	0%

The purpose of this question was to determine the FAO attitude toward litigation related to failure to follow standard work. While 86% in the previous question agreed failure to follow standard work increased the error rate, only 73% felt the litigation risk was higher and surprisingly 38% either disagreed or were unsure of the impact on litigation that failure to follow standard work presented.

Which of the following are barriers to implementing standard work

a. Staffing		b. TT's		c. Hours		d. Account		e. Lack Stand Work	
6	12%	18	38%	8	17%	28	60%	13	28%

The purpose of this question was to identify what the staff of the FAO believed were the main barriers to implementing standard work practices. It is interesting to note the majority of the responses list a lack of accountability as the primary barrier to standard work. Many employees see discipline as the way to hold everyone accountable except for themselves. 38% felt temporary transfers coming into the room to replace regularly assigned staff increase variation and create a barrier toward standard work while 28% feel the lack of standard practices are the primary reasons standard work struggles in the FAO. Only 17% felt the twenty-four hour shift schedule was a barrier.

Standard work is unnecessary and inhibits creativity in the FAO

a. Strongly agree		b. Agree		c. Undecided		d. Disagree		e. Strongly Disagree	
2	7%	3	6%	5	10%	31	63%	7	14%

The purpose of this question was to determine the attitude or culture toward the subject of standard work in the FAO. While 77% felt the statement was incorrect and that standard work was not a barrier to creativity 13% responded it was indeed a barrier.

Visual management to give instant feedback would be a benefit in the FAO

a. Strongly agree		b. Agree		c. Undecided		d. Disagree		e. Strongly Disagree	
6	12%	29	59%	13	27%	1	2%	1	2%

The purpose of this question was to determine if the FAO staff believed having visual clues such as monitors to demonstrate the calls on hold waiting to be answered, the number of cardiac arrest calls they handled, etc would be a benefit in the dispatch center. Seventy-seven percent either agreed or strongly agreed it would be of benefit while 27% remained undecided and a mere 4% did not feel it would be an added benefit.

The current policies in the FAO promote standard work

a. Strongly agree		b.		c. Undecided		d. Disagree		e. Strongly	

		Agree						Disagree	
4	8%	32	68%	4	8%	9	18%	0	0%

The purpose of this question was to determine if the staff believed that policies currently in place in the FAO promoted standard work. Although 18% did not feel the current policies promoted standard work, the vast majority at 76% felt it did.

Variation exists in the practices of the FAO

a. Strongly agree		b. Agree		c. Undecided		d. Disagree		e. Strongly Disagree	
7	14%	32	65%	8	16%	2	7%	1	2%

The purpose of this question was a follow up to an earlier question on standard work and whether it is administered consistently. It appears from the responses received that 79% felt variation does exist in the FAO while 16% are undecided and 9% do not seem do see variation. These findings reveal that although standard work may be present to some extent in the FAO, it is not administered evenly and at all times.

Variation of process is a barrier to increased proficiency in the FAO

a. Strongly agree		b. Agree		c. Undecided		d. Disagree		e. Strongly Disagree	
4	8%	24	49%	13	27%	8	16%	0	0%

Variability of processes has been linked to error and the implementation of standard work has been statistically proven to reduce variability. As a follow up question, the purpose was to see if answers were consistent in the FAO staff understanding of standard work. This question looked at the decrease in proficiency related to variability. 57% felt variation of processes was a barrier to better proficiency in the FAO while 16% felt it was not a barrier and disagreed with the statement. 27% remained uncommitted either way.

Quality assurance is an important tool to reduce variability in the FAO

a. Strongly agree		b. Agree		c. Undecided		d. Disagree		e. Strongly Disagree	
8	16%	33	67%	4	8%	3	6%	0	0%

Quality assurance is an opportunity to identify organizational needs such as policy

changes and educational opportunities. It helps to reduce variability. It is frequently seen as a

"gotcha" form of management when it is used simply as a tool to hold people accountable for

policy violation. The purpose of this question was to determine the FAO attitude toward the

concepts of quality assurance. Overall, 83% felt quality assurance was an important tool to

reduce variability while only 6% disagreed.

Standardization of work will decrease variability and the risk of error

a. Strongly agree		b. Agree		c. Undecided		d. Disagree		e. Strongly Disagree	
9	18%	29	59%	6	12%	3	6%	1	3%

The purpose of this question was to determine if the staff of the FAO had the belief and

confidence that implementation of standard work in the FAO would reduce variability and error.

While 9% felt it would not matter, the large majority at 79% agreed or strongly agreed standard

work practices promoted a reduction in variability and error.

Policies in the FAO should have flexibility built into them to allow creativity
and you to do what you need to do

a. Strongly agree		b. Agree		c. Undecided		d. Disagree		e. Strongly Disagree	
11	22%	33	67%	4	8%	2	4%	0	0%

Firefighters are not always known for their appreciation of rules and policies within the

organization. This question was designed to determine the culture that existed by the FAO staff

as it relates to their ability to handle the request that is outside the typical call they process on a

daily basis. An overwhelming 89% felt that the policies should have flexibility built into them to

allow creativity when determined. This is a really important finding as it describes the overall

mindset of the FAO staff and questions their true understanding of standard work practices.

Standard work is the same as standard operating procedures

a. Strongly agree		b. Agree		c. Undecided		d. Disagree		e. Strongly Disagree	
2	4%	23	47%	11	22%	12	24%	0	0%

The purpose of this question was to gauge the understanding of standard work by the

staff of the FAO. As described within this paper standard work is a process to reduce variation

while standard operating procedures are how the standard work gets accomplished. Fifty-one

percent of the respondents felt they agreed that the two concepts were the same while 22% were

undecided and 24% disagreed. This leaves the author with the understanding that more

education will be required on the differences between standard work and standard operating

procedures.

Implementation of standard work will lead to civilianization of the FAO

a. Strongly agree		b. Agree		c. Undecided		d. Disagree		e. Strongly Disagree	
3	6%	4	8%	19	39%	16	33%	5	10%

The purpose of this question was to gauge the culture of the FAO as it related to the

threat of civilianization. A common concern is that firefighter/emergency medical technicians

have a better understanding of what will be needed by responding crews and any attempt to

standardize work will lead to civilianization of positions within the FAO. This concern is not

reflected in the responses contained in this questionnaire. Only 14% agreed with this statement.

While 43% disagreed with the statement, a large percentage at 39% remained undecided.   It

appears some variation exists in the responses of the FAO staff. It may be attributed to the

misunderstanding a specific question.

FF Pence is able to see how standardized concepts that Subway institutes have value to the fire service. Pence demonstrated the website Subway University. This is the on-line training and reference package for all subway franchises. This site is password protected and provides access to all training material including visual management systems to demonstrate the proper procedure for every process from accepting, and cleaning vegetables to making sandwiches with the exact layout and amount of meats and cheeses. The website covers every aspect of the stores operation and Subway assigns a development agent to the store owner. Although standardization is stressed from day one, they do have some variety stores are allowed to decide upon themselves. For example, there are sandwich's that are considered core and required in every Subway shop, but you can elect to have other's based on customer demand.

As a franchise, stores are under contract to follow the required standard practices. Pence also stated inspectors from Subway come to the stores monthly to watch them make sandwiches and secret shoppers frequent the business. Pence stated that:

> "Being an owner, I have learned that standardization makes everyone's job easier. If everyone does what Subway wants done, things would go a lot easier. There would be fewer problems and less customer complaints".

Pence believed the biggest barrier to maintaining standard work is when he is not present in the stores. He handles variances by re-education of the employees via the university website and through progressive discipline. Pence found the value of having this access when he related the story of a dissatisfied customer who complained that Pence's Subway shop was shorting them on meats compared to another store. The store was able to pull the site up and show specific institutional instructions confirm he was doing things correctly and the other store was introducing variation into the process and responsible for her dissatisfaction. (Appendix D)

FF Hammond was interviewed on July 12, 2011 regarding standard work in the FAO. He took great interest in the discussion and the work that is being done in the FAO. He spoke specifically about his ability to see variation and process waste in the FAO. He believed that his education from Honda influenced him to look at these processes differently than the average staff member is able to in the FAO. He believes that variation does exist between assigned staff and the temporary staff. He felt the main reasons for this were a lack of on-going accountability and education for following standard work practices and a lack of management understanding on how best to implement these practices. He also stated that each temporary transfer is used in different amounts, with no specific monthly time requirement. He believed some were better able to adapt to changes and standard process flow because they worked more often in the FAO.

Through The Ohio State University program in Operational Excellence, site visits were made to Giant Eagle on May 7, 2011, then Cardinal Health and Nationwide Insurance on June 4, 2011. The visits demonstrated how powerful visual aides were in gaining employee engagement into the process. Each facility had dedicated boards where work flow, production, and compliance, were reported and made visual to the users. Benchmarks had been established, trends were tracked and the gaps existing in the performance were charted. Examples of standard work that promoted efficiency, cost effectiveness, and reduced waste were presented during the tour. The main take away was these organizations made this a culture within the organization. They promoted it as a journey instead of a race and they felt it made their organizations stronger.

Emergency requests received at the FAO were studied and quality assurance data was gathered in six areas for each of the three shifts. Data from staff members assigned to the FAO were compared to the alternate staff in an attempt to answer the following research questions:

Do areas of variability exist within the FAO? Does the use of temporary staff increase the

variation? Two hundred calls were randomly reviewed over a two week period and the data is

reflected below.

1Unit	Assigned	Temporary
* Answers phone correctly 97%	97%	97%
* Verifies Address 95%	96%	95%
* Confirms callback # 90%	92%	87%
* Confirms city code 98%	98%	97%
* Transfers when appropriate 95%	100%	90%
* Initiates pre-arrival instructions 84%	88%	79%

2Unit	Assigned	Temporary
* Answers phone correctly 98%	98%	97%
* Verifies Address 96%	97%	94%
* Confirms callback # 92%	94%	91%
* Confirms city code 96%	100%	90%
* Transfers when appropriate 100%	100%	100%
* Initiates pre-arrival instructions 80%	90%	70%

3Unit	Assigned	Temporary
* Answers phone correctly 98%	99%	98%
* Verifies Address 96%	99%	94%
* Confirms callback # 94%	94%	94%
* Confirms city code 98%	100%	98%
* Transfers when appropriate 99%	100%	98%
* Initiates pre-arrival instructions 86%	90%	82%

Was the call answered using the standard accepted method?

Of the 200 calls reviewed during this time period 97.6% were answered in the correct

method. The assigned staff answered the phone correctly in 98% of the cases and the temporary

staff in 97.3%. There was no variation noted between assigned and temporary staff noted in this

area.

Was the address of the emergency verified as required by the standard work?

Address verification and call back numbers is the staple of the communication center. Approximately 76% of calls are now received by cell phones. The technology is not as enhanced as calling from a landline. This makes verification of the location of the emergency even more important. Dispatchers are required to verify the location of the emergency request and the FAO has experienced variation in this area previously which has lead to companies being sent to the wrong address. Quality Assurance (Q/A) data revealed that address and call back number was verified 97.3% of the time by the assigned staff and 94.3% in the temporary staff. The target in this area is 100%. The variation noted between assigned staff and alternates was 3% and the total gap was 4.5% of the total calls.

Was the call back number verified as required?

When calls are received by the 9-1-1 center the automatic number locator gives a number the caller is thought to be calling from. These numbers are generally very accurate, but in certain situations they have been incorrect. Once the call is disconnected information is lost unless it was recorded somewhere. Each call has the number transferred onto the dispatch screen. It is considered appropriate practice for the call taker to verify the callback number in the event there is need to call the requester back. The expectation is this is completed in 100% of the cases. The overall average was 89.6%. This demonstrates a 10.4% gap which verifies variation in the process. The assigned staff completed this correctly in 93.3% and the alternate staff correctly completed this step in 90.6%. This 2.7% gap confirms some variation between assigned and temporary staff.

Did the call taker confirm the city code?

While the City of Columbus dispatches for several municipalities in the Franklin County area, they do not have a common regional communication center. This requires the call takers to verify what jurisdiction the requester is in. There are over 4,400 repetitive streets in the cities CAD system such as High Street, Main Street, etc. Over 200 streets have the same numeric range producing significant opportunity for error to occur when the requester location is not verified. Overall average for confirming the city code the caller was in was 97.6%, with the assigned staff completing this task 99.3% of the time compared to the alternates performing this correctly 95% of the time. Although a 4.3% variation between staff members existed the overall gap was 2.4%.

Were calls transferred to the appropriate agency as required if the call was not for the Columbus FAO?

The FAO has also experienced variation in this area that has lead to the unfortunate delays in call transfer and response of emergency crews due to inappropriately transferring calls. Dispatchers have several reasons for not transferring calls in the Columbus FAO, but all are a variation from the standard work in place. Calls received by the Columbus FAO that were transferred appropriately as required by assigned staff was 100% and the temporary staff made the appropriate transfer 96% of the time. This is another expectation of 100% so the gap in this case is 4%. This is an area that places great liability to the city of Columbus due to the chance of error from letting the caller hang up then passing on bad information to the PSAP where the emergency is being transferred.

Were pre-arrival instructions given to the caller as required by policy?

Pre-arrival instructions are a national standard for communication centers. The City of Columbus is switching to the Priority Dispatch model for both fire and EMS. Currently pre-arrival instructions are encouraged but not demanded in every situation. Only 83.6 of calls had pre arrival instructions given overall. The assigned staff provided instruction in 89.3% of the time alternate staff just 77%. Significant variation is seen between the assigned staff and the alternate staff.   This is a systemic issue from the lack of expectation within the FAO for dispatchers to provide this information in every situation presented to the FAO. It opens the city to liability and negative publicity as evidence strongly suggests that this is a public expectation of their 9-1-1 centers.

Quality assurance (Q/A) data was also collected regarding dispatcher pre-arrival instructions in cardiac arrest. (Appendix E) There has been considerable simplification of by-stander cardiopulmonary resuscitation (CPR) instructions in the last year in an attempt to get a greater percentage of public involvement in cases of out-of-hospital cardiac arrest. The purpose of this research was to help answer the question of whether variation exists in the FAO and whether the use of standard work practices help to reduce the variability. Every 9-1-1 call that involves cardiac arrest is reviewed for specific dispatcher instructions to the caller and they are presented in Appendix F. The evidence demonstrates a significant reduction in variation. It appears that Q/A review and follow up have had a positive impact on assuring that standard work practices are followed.

Discussion

The research completed demonstrates that standard work practices are utilized in many disciplines of work. Standardized work has been statistically proven to level work flow, reduce, waste and decrease variability in practices. (Liker, The Toyota Way) The staff of the FAO

believe standard work exists in the communication center but implementing and sustaining

standard practices are a barrier to doing their job. It appears there is the belief that call takers are

comfortable their previous experiences being primary way of learning, and implementing and

requiring standard work will increase call to dispatch times and take away their ability to do what

they need to do to serve the caller and the responding crews.

Most dispatchers recognize the responsibilities they have and the scrutiny they can come

under very quickly from the employer, public, and media. The vast majority of calls are handled

incredibly well by these seasoned call takers and they do good things every day the average

person never hears about. Unfortunately all of the good work that occurs in communication

centers can be called into question by one lapse.

There can be no improvement without standardization of work. The process must be

stable in order for standardization to take root. It is not a standalone answer to solving the issues

around reducing variability. Standard processes and procedures are the biggest key to creating a

consistent overall performance. Dispatch centers are attractive places for these processes.

Standard work is successfully implemented in places where the work is repetitive, the equipment

used is reliable, and the quality issue is a minimal distraction.

Every day in the FAO good work is being completed by staff that the responding crews

and fire administration never hear about. But what is good enough? Is 99% accuracy a value to

be satisfied with? If the FAO staff in Columbus is accurate 99% of the time, then based on an

average of 440 dispatched runs a day they would make a mistake on 4.4 runs a day or 1600

errors a year.

Pre-arrival instructions are an example of standard work in place in communication

centers. Although the Columbus Fire Department has pre-arrival card system in place the

standard use of the cards are extremely sporadic. Quality assurance review of calls involving

EMS related complaints reveal many calls takers are cross trained as paramedics. Ironically they

actually have a slightly higher call to dispatch time on average than non paramedic call takers.

When you listen to a variety of calls from each group it is interesting to hear the paramedic call

taker frequently asking questions similar to ones that a typical paramedic would ask in an

assessment at the patient's bedside compared to the non paramedic. There seems to be pushback

against using the card sets for creating standard work. When questioned there are a variety of

reasons but most commonly the call takers appear to feel they know what to say and do from

experience and believe the cards are unwarranted and increase call to dispatch times. It is also

noted there is a perception that using the cards will require additional call takers to be present

because in a busy center answering 25,000 emergency requests a month they are too busy to use

the card system

       The lack of pre-arrival instructions is especially concerning. There is an expectation of

the public that pre arrival instructions will be given. There have been several lawsuits filed

against cities for the failure to provide these instructions.

       It was interesting to talk to the firefighters of the FAO during this process. Frequently

they would make statements like "It is hard Chief. This is not a manufacturing facility. It

changes here rapidly and it's always different."   Yet these rapid, frequently changing, and

always different situations are the very reason standard work practices should be required. It

also helps to bring the research conducted within this project to the conclusion that in fact

variation occurs in the FAO and a variety of opinions exist on how to process calls in a correct

and timely fashion. The implication to the organization is that implementation of standard work

practices reduces variability, reduces waste, and improves productivity.

A recent example summarizes how standard work should occur within an organization. The Columbus Division of Fire has the responsibility of working with the county emergency management agency (EMA) to test and activate the tornado sirens in the event of poor weather in the Franklin County area. Each Wednesday at 1000 hours the siren is tested. There is a different sequence for setting off the test compared to setting off the actual siren. Wednesday May 22, 2011 was a clear blue sky day in Columbus, when the siren test was set off incorrectly. The actual emergency siren sequence was set off by our FAO. This is the second time over the last several years where the test was conducted incorrectly. In the first situation there was damage done to several of the sirens. In the second situation it was a mere inconvenience and generated several questions from the public and the media.

Appendix G describes the process that was in place for setting off the sirens. After meeting to determine the cause and effect of the error, it was determined the standard work that existed was excessive and difficult to follow. It appeared to have contributed to the error. A simpler, cleaner method was produced with the assistance of EMS and instituted into the training of the FAO and is demonstrated in Appendix H. This is an example of how people do not purposely make errors and when errors are investigated you need to complete a cause and effect analysis then examine the process to determine if it is contributing to the factor of error.

Visual management only works well within the organization if strategies and goals are being measured are shared within the organization. The staff has to have the opportunity to be involved in the process development, the goals measured are attainable. Employees must see a commitment from management to help achieve the goals so all have a sense they are making a difference.

Recommendations

Go visualize the process in the FAO.

In order to understand the process and how the system flows, you must go to the Gemba, defined by lean management leaders as the place in your organization where value is created. To the Columbus FAO the value is not created in the administrative offices, it is created in the dispatch center. In the words of Ohno "you see with your feet not with your eyes, because from behind a desk is a very dangerous place to judge the world." (Liker, Toyota Talent, 2007)

The intent of this recommendation is to see what occurs in the process and begin visualizing the current state. Top and middle management need to be involved in this process from the beginning. This will help build a foundation for shared ideas and thinking. This will also give additional opportunities to share the message of the purpose of standard work building slowly off small opportunities. (Jr., 2002)

Establish current state

The current state is what is currently happening now. In an attempt to understand where you want to see the organization move in the pursuit of standard practices, you must have to have an understanding of where your organization currently is regarding standard work. This is accomplished by the observation of current practices and quality assurance in the FAO. By making the current state visual you get a better idea where the waste is in the process and where variation exists in the information and processes of the FAO. These visual cues consist of benchmarking the current situation then mapping the processes out on a white board where an entire group can see and weigh in on the process flow.

Determine Future state

Once the current state of the process is identified, we can then begin to look at what the ideal situation would and could be for the process. This can include all of the processes within the flow of the call answering and dispatching process. This is defined as the future state and can be mapped out as well. Once the current state and the future state are created you will then see where the gaps exist in the process flow of creating standard work.

Once a future state is determined and mapped out you can then identify and visualize the gaps existing in the process steps. This is the area being tackled by the standard work practices to be implemented, assessed for impact and adjusted as needed.

Apply standard work practices

Implementing standard work practices should require the input of those being impacted by the process change. This helps to give credibility to the institution and make it easier to gain buy in from the staff members. How staff will be impacted by the changes and what process was used in the decision making must be addressed.

Education must occur throughout the process to assure the staff understands the current state of standard practices and where the administration would like to see standard work move to in the future. The education must consist of the key elements of why it is important to the FAO and the City of Columbus. The staff should be involved in the discussions about where the organization currently is and where they want to see themselves moving forward.

Implement visual controls

Staff must be able to see the assessment of their work. This must be visual and easy to understand. When staff sees for themselves what the data demonstrates, it is a powerful tool. There will be a period of uncertainty and in some cases grief. Many will consider a change to be

bad as they navigate away from the way we have done things previously to a new model. Many will question the need for change and who is authorizing or forcing this change upon the staff.

Visual controls play a key role in maintaining countermeasures that have been put in place. Unless there is ongoing assessment and feedback, administration has no idea if the countermeasure has been effective or needs to be adjusted. Staff members are more likely to buy in to the conceptual changes if they can see that their labor is being recorded, reviewed, and reported back to them. If they see visual evidence the standard work is reducing variability and not negatively impacting their work, it will take away all of the arguments against standardizing the work flow.

Ensure future sustainability

Sustainability occurs through the concepts of 5S. This term comes from the Lean management Six Sigma community after being developed by Hiroyuki Hirano. Completing a 5S consists of sorting, simplifying, scrubbing or cleaning, standardizing and sustaining. It is a method to help eliminate waste by reducing rework, out of service time for equipment, and waste. It is often seen as one of the weakest links in the lean principles, therefore being one of the most difficult to implement because it is not a sexy part of the standardization process. But it is a required part to maintain your progress and prevent regression back to old habits. The Columbus Fire Department has recently implemented a new CAD system which provides more information to the call takers and responders than ever before. While this technology is fascinating and provides added value, it is only as good as those entering the data on the dispatching end.

In summary, the future sustainability of the fire service will require us to look at process improvement differently. There is nothing revolutionary about the implementation of standard

work. Simply, it is a different way of looking at common sense and making the process visual.

Entirely too often we begin a counseling session with the phrase "Tell me what happened?" We

need to rethink our investigation of these situations and realize the proper focus should be "Did

you follow the standard work?" If the member did, then the process is flawed and needs to be

evaluated again and changed to not let the employee down. When standard work is implemented

and followed, it reduces variation, costs, error, re-work. It can challenge the employee to look

for other ways to reduce waste in processes and expenses to make the organization stronger and

more cost effective in today's challenging economy.

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Appendix A

Questionnaire on Standardized Work Flow in the Columbus Fire Alarm Office

National Fire Academy/Executive Fire Officer Program

James E. Davis

I am currently enrolled in the Executive Fire Officer Program at the National Fire Academy in Emmittsburg, Maryland. I am currently completing a research project on creating standardized work flow in the Columbus Fire Alarm Office as part of the first year requirements of the program.

Attached is a questionnaire that I would appreciate you taking the time to answer. Although I would appreciate your participation, you are not required to take part in this questionnaire. If you have any questions or concerns please contact me or call me at extension 2390.

Thank you for your time and consideration.

Respectfully

B/C James Davis

Fire Alarm Office

Appendix B

1. How often do you see standard practices in the fire alarm office
   a. Always   b. Sometimes   c. Rarely   d. Never

2. The policies of the FAO practiced consistently across the three units?
   a. Strongly agree   b. Agree   c. Undecided   d. Disagree   e. Strongly Disagree

3. Failure to follow standard practices in the FAO causes increases in call to dispatch times
   a. Strongly agree   b. Agree   c. Undecided   d. Disagree   e. Strongly Disagree

4. Failure to follow standard work practices causes increase in errors in the FAO
   a. Strongly agree   b. Agree   c. Undecided   d. Disagree   e. Strongly Disagree

5. Failure to follow standard work practices potentially places the city at risk of litigation
   a. Strongly agree   b. Agree   c. Undecided   d. Disagree   e. Strongly Disagree

6. Which of the following are barriers to implementing standard practices
   a. staffing levels   b. alternates   c. shift hours   d. accountability   e. Lack standardized work

7. Standardized work flow is unnecessary and inhibits creativity in the FAO
   a. Strongly agree   b. Agree   c. Undecided   d. Disagree   e. Strongly Disagree

8. The use of visual management clues such as status boards o give in to give instant feedback would be a benefit in the FAO
   a. Strongly agree   b. Agree   c. Undecided   d. Disagree   e. Strongly Disagree

9. The current policies in the FAO promote standard work practices
   a. Strongly agree   b. Agree   c. Undecided   d. Disagree   e. Strongly Disagree

10. Variation exists in the processes of the FAO
    a. Strongly agree   b. Agree   c. Undecided   d. Disagree   e. Strongly Disagree

11. Variation of processes is a potential barrier to increased proficiency in the FAO
    a. Strongly agree   b. Agree   c. Undecided   d. Disagree   e. Strongly Disagree

12. Quality assurance is an important method to reduce variability in the FAO
    a. Strongly agree   b. Agree   c. Undecided   d. Disagree   e. Strongly Disagree

13. Standardization of work will decrease variability and chance of error
    a. Strongly agree   b. Agree   c. Undecided   d. Disagree   e. Strongly Disagree

14. Policies in the FAO should have flexibility built into them to allow creativity and to allow you to do what you need to do
    a. Strongly agree   b. Agree   c. Undecided   d. Disagree   e. Strongly Disagree

15. Standardized work is the same as standard operating procedures
    a. Strongly agree   b. Agree   c. Undecided   d. Disagree   e. Strongly Disagree

16. Implementation of standardized work to reduce variability will lead to civilianization of the FAO
    a. Strongly agree   b. Agree   c. Undecided   d. Disagree   e. Strongly Disagree

Appendix C

Sandwich Unit Formula Chart

Cut out charts out on dotted lines and adhere to Sandwich Unit in the appropriate places using double sided tape.

				Speed Oven Category
BLT	8 bacon	4 bacon	---	1 Meat/Hotwel
Chicken & Bacon Ranch	2 trays, 4 bacon, double monterey cheddar cheese	1 tray, 2 bacon, double monterey cheddar cheese	---	Steak +Strips
Chicken Breast	2	1	---	Patty
Chicken Teriyaki	2 trays	1 tray	---	Steak +Strips
Cold Cut Combo	1 set-up	1/2 set-up	---	Combo Subs
Feast	6 pepperoni, 6 salami, 6 ham, 4 RB, 4 turkey	3 pepperoni, 3 salami, 3 ham, 2 RB, 2 turkey	---	Double Meat
Ham	8	4	2	1 Meat/Hotwel

				Speed Oven Category
Italian B.M.T.	6 pepperoni, 6 salami, 4 ham	3 pepperoni, 3 salami, 2 ham	---	Combo Subs
Meatball	8	4	---	1 Meat/Hotwel
Philly Steak	2 trays (8oz) double cheese	1 tray (4oz) double cheese	---	Double Meat
Roast Beef	8 (5.oz.)	4 (2.5oz.)	2 (1.25oz.)	1 Meat/Hotwel
Spicy Italian	10 pepperoni, 10 salami	5 pepperoni, 5 salami	---	Combo Subs
Subway Club	4 turkey, 2 ham, 4 RB (2.5oz.)	2 turkey, 1 ham, 2 RB (1.25oz.)	---	Combo Subs
Subway Melt	4 turkey, 4 ham, 4 bacon	2 turkey, 2 ham, 2 bacon	---	Combo Subs

				Speed Oven Category
Tuna	4	2	1	1 Meat/Hotwel
Turkey	6	3	2	1 Meat/Hotwel
Turkey & Ham	4 turkey, 4 ham	2 turkey, 2 ham	---	Combo Subs
Other Toppings: Bacon	4	2	2	
Cheese	4 (oz. shredded)	2 (0.5oz. shredded)	2	

		0.75oz	3	3	3*	3	3*	0.25oz	3*	3*
		0.5oz	2	2	2*	2	2*	0.12oz.	2*	2*

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Appendix D

Interview with FF Dave Pence conducted at Fire Station 16 on Sunday May 29, 2011 at 1700 hours. FF Pence was asked the following:

1. Do you see standardized work practices at Subway?
2. Do you see standardized work practices in the Columbus Fire Department?
3. Do you see a similarity in standard work practices between the two organizations?
4. Can you describe Subway's management philosophy in standard work?
5. Can you tell me about Subway University?
6. What are the biggest barriers in implementing standard work at Subway?
7. How do you assure standard work practices at Subway?
8. Is there any autonomy in the Subway organization?

Interview with FF Dennis Hammond conducted in the Columbus Fire Alarm Office on Tuesday June 14, 2011 at 1300 hours. FF Hammond was asked the following:

1. How long did you work for Honda of America in Marysville?
2. Did you learn about standard work working at Honda?
3. Were you involved in the implementation of standard work at Honda?
4. Do you see standard work practiced in the Columbus Fire Department?
5. What areas do you see standard work being a benefit here in the FAO?
6. What do you see as the barriers to standard work in the FAO?
7. How would you suggest implementing standard work and how do you hold those accountable for the standard work?
8. What advice would you have for implementing standard work in the FAO from your experiences at Honda?

Appendix E

CPR Quality Assurance Worksheet

Date_____

Incident #_____

Call Taker_____

Did the Call taker verify call back number and address?

Did the Call taker make a call back if disconnected?

Did the Call taker verify unresponsiveness?

Did the call taker verify breathing and time the breathing pattern

Did the call taker encourage pre-arrival CPR?

Did the call taker get compressions started?

Did the call taker count out compressions at least initially to get the rescuer started?

Did the run get dispatched as quick as possible during this sequence?

Did the call taker reassure the caller that help was on the way?

Did the call taker get the patient on their back and onto a hard surface if possible?

Did the call taker describe the proper location for performing appropriate compressions for the age of the patient?
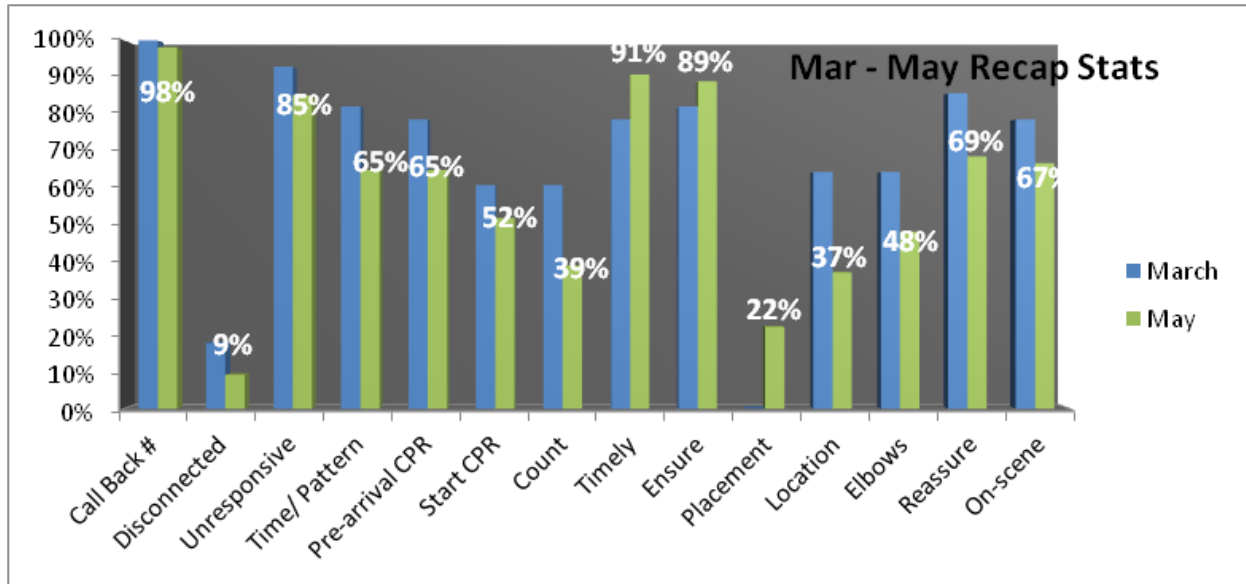
Did the call taker have the rescuer lock their elbows and push straight down hard and fast?

Did the call taker give positive reassurance and follow – up?

Did the call taker advise the rescuer when help was on the scene and assure the door was unlocked or timely arrival of crews was made available?

If no to any of these questions, please describe what could or should have been done

Appendix F
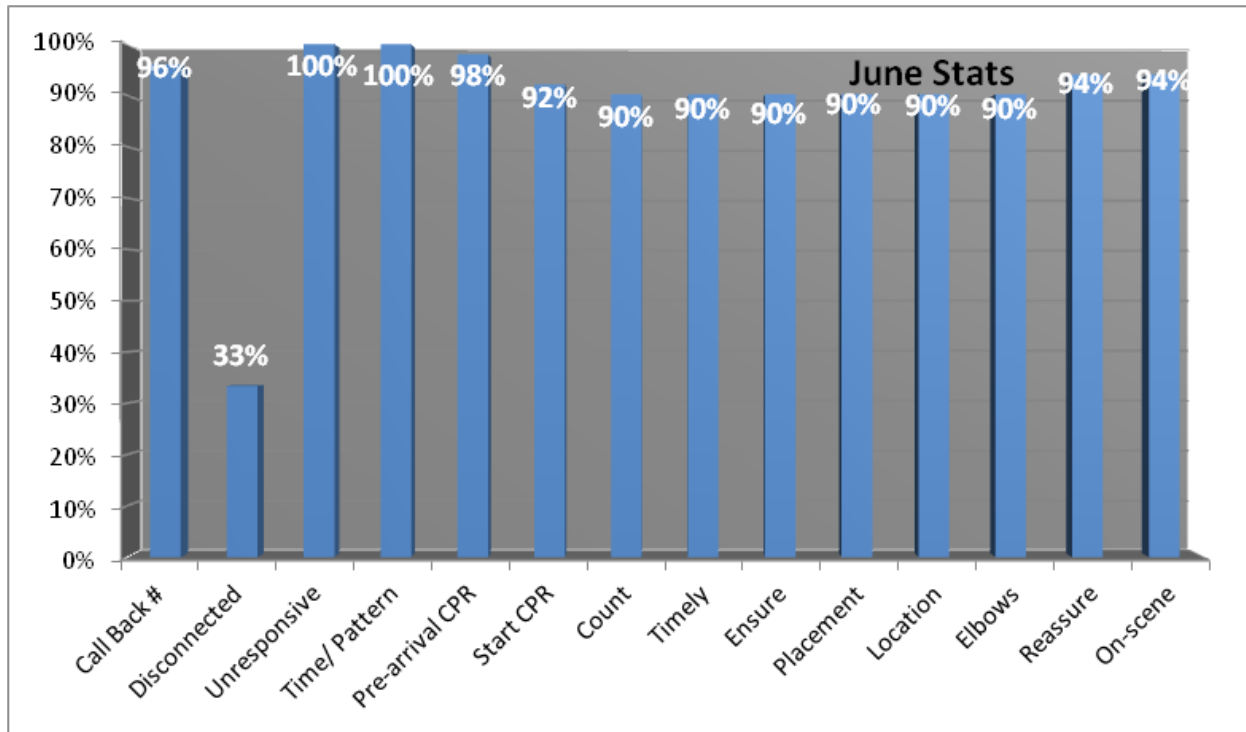
Appendix G

WEEKLY NOON TEST

The noon test is performed every Wednesday, weather permitting. The EM&HS office will be the one to determine if the noon test will proceed. They will notify the CFAO or Westerville dispatch as to the status of the noon test.

EM&HS will call at least one minute prior to noon to make this notification. The EM&HS does the noon test the first Wednesday of the month which is when the voice capabilities of the sirens are tested. The other Wednesdays of the month the noon test of the system are conducted alternately by the Columbus Fire Alarm Office and Westerville Dispatch, which are the other two activation points for the siren system.

ACTIVATION

The following sequence is used to sound the noon test:
1) **Press the CALL KEY 2** button, located in the upper left side of the activation unit.
2) **Then press the SEND** button, located in the upper right side of the unit. This will sound the sirens for 20 seconds, off for 40 seconds, sound for 20 seconds, off for 40 seconds.

Appendix H

WEEKLY NOON TEST

Activation and Cancellation Sequence

ACTIVATION

1. Press **CALL KEY 2**

2. Press **SEND**

CANCELLATION

1. Press **CALL KEY CANCEL**

2. Press **WARNING TONES**

3. Press **ALL** Button

4. Press **ENTER** Twice

5. Press **SEND**

FRANKLIN COUNTY
Emergency Management
and Homeland Security

OHIO
Michael R. Pannell, Director

614-794-0213